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ABSTRACT

The purpose of this paper is to summarize an evaluation of the PLATO career information development system (CIDS) at two sites in Illinois: Truman College, Chicago, and the Champaign Comprehensive Employment and Training Act Consortium. Data were obtained between March 31 and June 28, 1982 from 229 users in regard to six questions/issues that were identified as central to any CIDS evaluation: (1) length of time required by students for system use; (2) implications of an automated system for the role of counselors and teachers; (3) cost feasibility; (4) benefits to students, counselors, faculty, and institutions as a whole; (5) patterns of response in system use and problems of special groups, disadvantaged students, and older users; and (6) factors most likely to affect system use. Following the discussion of the evaluation and the narrative account of findings, evaluation techniques used to study each of the issues are described, together with advantages and disadvantages of each and alternative approaches that could be utilized. Appendixes include screen copies of the on-line user log, an interview form and questionnaire used in the evaluation, and a description of PLATO CIDS. (YLB)

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EVALUATING AN AUTOMATED CAREER INFORMATION DEVELOPMENT SYSTEM: RESEARCH RESULTS AND TECHNIQUES FOR SYSTEM ASSESSMENT

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EVALUATING AN AUTOMATED CAREER INFORMATION DEVELOPMENT SYSTEM: RESEARCH RESULTS AND TECHNIQUES FOR SYSTEM ASSESSMENT

INTRODUCTION

The purpose of this paper is to summarize research results from evaluation of one automated CIDS project, identify basic evaluation questions of interest to institutions and system users, and analyze techniques which may be used to study system implementation. The research project which formed the basis for concepts and findings was conducted by the University of Illinois at Urbana, in cooperation with HORIZONS, a program of the Illinois Occupational Information Coordinating Committee. The Career Information System (CIS) developed by the University of Oregon was adapted for statewide delivery on PLATO, a computer network based at the Computer-based Education Research Laboratory in Urbana. (See Appendix B for description of PLATO CIS.)

STUDY DESCRIPTION

Data were obtained between March 31 and June 28, 1982, from a sample of 229 CIS users, aged 17 - 61. Two sites were used: Truman College, a Chicago inner city community college located in a poor, ethnically diverse area; and the Champaign CETA Consortium, which provides intake and assessment for the structurally unemployed from a four-county area in central Illinois. The economic base is principally agriculture and retail sales. Total enrollment at Truman College is approximately 6,000; more than 1,000 participants were served by the Consortium in the first three quarters of 1982. Of the 229 CIS users studied, 137 were enrolled at Truman College and 97 were CETA participants of the Consortium. Responses thus reflected both rural and urban orientations of young-to-middle aged adults.

The sample was racially and ethnically heterogeneous. The majority were Black (45%), or Hispanic (12%), with Whites (32%) and other races comprising the remainder (see Table 2). The economic status of virtually all individuals in the group was disadvantaged, either by Department of Labor Standards, or other commonly used poverty criteria. The community served by Truman College has high proportions of new immigrant populations, noticably Indochinese, Russian Jews, Mexicans, and Native Americans. Many suffer from barriers to employment which are cultural in derivation.

Of the 229 users, fifty-one per cent were male. However, at the individual test sites, females predominated in the Truman sample (56%), while a majority of users were male at the CETA

Consortium (59%). At both locations, the largest single age group was young adults, 21-29, who comprised nearly half the total sample. About 25% fell between ages 17 and 20; the remainder were 30 or over (see Tables 1, 3 and 4).

In terms of vocational orientation, about 60% of the Truman College users were enrolled in career programs, with the remainder in liberal arts, general studies, or arts curricula. Only 17% of the 136 students studied at Truman stated that they were still at a broad career exploration stage. At the Consortium, all users had experienced a period of at least 1 week's unemployment before meeting eligibility requirements for CETA enrollment. All were oriented toward immediate labor market entry. Thus, the vocational orientation in the total sample was strong.

PLATO CIS was used at Truman College as an adjunct to three career counseling courses and one urban skills center program. Only six students in the Truman sample used CIS on an individual basis following an assignment from the counseling office. At the CETA Consortium, CIS was used during testing and assessment of participants following certification of CETA eligibility. A streamlined version of CIS was developed with reduced options. This procedure minimized the amount of attention required for supervision of users. The Consortium Job Club also included CIS as part of required content for its members. The Job Club prepares individuals for an effective job search once participants are job-ready.

The advantage of differences between test sites was that it permitted observation of responses to CIS under widely varying administrative constraints, in different economic environments, and

TABLE 1

Characteristics of CIS Users
By Age of Users
Champaign Consortium and Truman College
March-June, 1982

	CIS Users	
Age	Number	%
17-20	56	24%
21-29	106	46
30-39	45	20
40+	22	10
TOTAL	229	100%

TABLE 2

Characteristics of CIS Users
By Race of Users
Champaign Consortium and Truman College
March-June, 1982

	CIS Users	
Race	Number	%
White	73	32%
Black	104	45
Hispanic	29	13
Other	23	10
TOTAL	229	100%

TABLE 3

Characteristics of CIS Users
By Sex of Users
Champaign Consortium and Truman College
March-June, 1982

	CIS Users	
Sex	Number	%
Male	116	51%
Female	113	49
TOTAL	229	100%

TABLE 4

Characteristics of CIS Users
By Race and Sex of Users
Champaign Consortium and Truman College
March- June, 1982

	CIS Users			
Race	Number		Total Number	%
	Male	Female		
White	39	34	73	32%
Black	53	51	104	45
Hispanic	14	15	29	13
Other	10	13	23	10
TOTAL	116	113	229	100%

in response to different situational needs of users and counselors.

Several techniques were used to gather data for the study. Semi-structured interviews were conducted with 28 users following their first sessions in CIS. At the conclusion of two month's operation of CIS, unstructured follow-up interviews were held with 9 counselors and 3 administrators at the test sites. The principal data source was an on-line log which tracked time in all components of CIS for each user, recorded QUEST responses, and asked information from each user on age, sex, race, national origin, and satisfaction with CIS. Supplementary data were obtained at Truman College from computer files which contained admission records of students in the sample. Information was pulled on education intent at admission, academic level, program of study, course enrollment, and instructors for each user. For the Truman sample, then, it was possible to analyze time in CIS and user satisfaction for each student by course section and instructor, as well as in relation to demographic variables. This permitted a broader assessment of variables affecting student use, particularly when combined with instructor interviews and documents such as course outlines.

Another source of information on user response was the TERM COMMENT function on PLATO. As the user views any screen display, he or she may write comments, suggestions or criticisms at the bottom of the screen, after pressing the TERM COMMENT keys. The remarks typed in by the user are stored in a file which is read regularly by programmers, system designers, and potentially by other

individuals with an interest in the operation of the system. During the course of the study, over 1,780 notes were collected, February 1 - July 31, 1982. Approximately 60% of the notes related to bugs, computer errors, pointer errors, bit pattern errors, or file and tape transfer problems. Ten per cent of the comments noted typographical errors, overwrites, blank spaces, and word processing problems. Thirty per cent represented suggestions for changes in wording, key connections, displays, and attribute coding. The TERM COMMENT file was thus a mechanism for intensive monitering of user problems and represented the single most significant means of assessing difficulties in system operations during development.

EVALUATION QUESTIONS

During the developmental period, after frequent interaction with staff and students at the test sites, six recurring questions were identified which should be central to any CIDS evaluation. These questions relate to both implementation and outcome of an automated system and were only partially addressed in this study. The questions -- formulated by students, staff, administrators, and potential external system funders were:

1. How long will it take students to use the system? Implicit were issues of throughput, student interest levels, scheduling, hardware requirements, and potential difficulties for students with language or literacy handicaps.

2. What are the implications of an automated system for the role of counselors and teachers? The concerns were that greater, not fewer demands might be placed on staff after automation, or that the counselor's role would be undermined. In particular, there were doubts whether disadvantaged students would respond well to computer-based information without substantial intervention and interpretation on the part of counselors or faculty.

3. Are costs feasible? Definition of revevant start-up costs were a major point from the perspective of administrators. Costs included not only hardware and software, but additional administrative overhead for site monitors, security, rental of space, and in the longer term, finding budgetary slack to meet maintenance and line charges. Other costs were identified by students and faculty, such as waiting time for terminal availability.

4. What benefits may be expected for students, counselors, faculty, and the institution as a whole? Will the experience be positive? In general, faculty and staff were disposed toward viewing automation favorably, largely because they were tremendously pressured with current workloads and hoped that any change might be for the better. However, there was a lack of specificity in expectations, even on the part of administrators. Definition of benefits was in fact crucial to curriculum planning, future funding of the system and stimulation of student demand.

5. What patterns of response may be expected from students? Will disadvantaged students, older users, and other special groups respond differentially to automated systems? Although faculty, counselors, and administrators were hopeful that responses would be relatively positive and homogeneous, it was in fact expected intuitively that certain groups might selectively require more structure and individualized attention from staff. However, neither prior research nor field experience gave definitive clues as to where problems or differential responses might be anticipated.

6. What factors are most likely to affect continued system usage? The problem of institutionalizing new technology was seen as a formidable one. How to maintain a level of commitment to the system, how to ensure its gradual integration with off-line counseling activities, and how to adapt software to meet emerging needs were perceived as serious issues, particularly if system costs were to be justified.

FINDINGS

Research findings from the PLATO CIS project were generally consistent with evidence from earlier studies of other automated CIDS, with some notable exceptions which are discussed below. The PLATO CIS data are important because (1) they permit analysis of user response by demographic characteristics; (2) multiple methods in data collection permitted a more complete view of the

total organizational context in which the system was implemented; and (3) the population using the system during development was unusually diverse, both geographically and demographically.

1. Length of time required by students for system use. The average user of PLATO CIS at the two developmental sites spent a total of 37 minutes in all parts of the system. There was a tendency for time spent on the system to increase with age, with those 30 and over spending most time (see Table 5). This tendency was particularly marked among white males (see Table 9). In general, there were no significant patterns by race alone, although Asian Americans tended to have more usage than other groups. It was not possible to determine whether language barriers, motivation, or other variables accounted for this difference (see Tables 6 and 8). No significant differences were found in usage by sex alone (see Table 7).

One of the most interesting findings was related to average time spent in QUEST, the interest inventory. Average time by all users was 12.7 minutes, less than reported in other studies of CIS where different delivery systems were used. The rapid response time and graphic feedback given to users on the PLATO system were thought to be responsible for this increased efficiency in QUEST completion. All members of the sample answered every question on the inventory, with the exception of two individuals who responded to less than 18 items.

TABLE 5

Time in CIS
By Age of Users
Champaign Consortium and Truman College
March-June, 1982

Age	CIS Users		
	Number of Users	Total Minutes in CIS	Average Minutes in CIS
17-20	54	1889	35.0
21-29	103	3841	37.3
30-39	45	1776	39.5
40+	21	810	39.0
TOTAL	224	8316	37.1

Missing Data = 5

TABLE 6

Time in CIS
By Race of Users
Champaign Consortium and Truman College
March-June, 1982

Race	CIS Users: Number of Users	CIS Users: Total Minutes in CIS	CIS Users: Average Minutes in CIS
White	72	2769	38.5
Black	102	3611	35.4
Hispanic	27	1002	37.1
Other	23	934	40.6
TOTAL	224	8316	37.1

Missing Data = 5

TABLE 7

Time in CIS
By Sex of Users
Champaign Consortium and Truman College
March-June, 1982

Sex	CIS Users: Number of Users	CIS Users: Total Minutes in CIS	CIS Users: Average Minutes in CIS
Male	114	4088	35.9
Female	110	4228	38.4
TOTAL	224	8316	37.1

Missing Data = 5

TABLE 8

Time in CIS
By Age and Race of Users
Champaign Consortium and Truman College
March-June, 1982

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	WHITE			BLACK			HISPANIC			OTHER		
Age	Number of Users	Total Minutes in CIS	Average Minutes in CIS	Number of Users	Total Minutes in CIS	Average Minutes in CIS	Number of Users	Total Minutes in CIS	Average Minutes in CIS	Number of Users	Total Minutes in CIS	Average Minutes in CIS
17-20	12	297	24.8	31	1133	36.6	7	268	38.3	6	209	34.8
21-29	33	1250	37.9	44	1562	35.5	13	470	36.2	13	559	43.0
30-39	17	777	45.7	20	680	34.0	4	153	38.3	4	166	41.5
40+	10	445	44.5	7	236	33.7	3	111	37.0	0	0	0
TOTAL	72	2769	38.5	102	3611	35.4	27	1002	37.1	23	934	40.6

Missing Data = 5

TABLE 9

Time in CIS
By Age and Sex of Users
Champaign Consortium and Truman College
March-June, 1982

	CIS Users					
	MALE			FEMALE		
Age	Number of Users	Total Minutes	Average Minutes	Number of Users	Total Minutes	Average Minutes
17-20	25	866	34.6	31	1041	33.6
21-29	51	1623	31.8	52	2218	42.7
30-39	32	1379	43.1	13	397	30.5
40+	6	220	36.7	14	572	40.9
TOTAL	114	4088	35.9	110	4228	38.4

Missing Data = 5

TABLE 10

Time in CIS
By Sex and Race of Users
Champaign Consortium and Truman College
March-June, 1982

	WHITE			BLACK			HISPANIC			OTHER		
Sex	Number of Users	Total Minutes in CIS	Average Minutes in CIS	Number of Users	Total Minutes in CIS	Average Minutes in CIS	Number of Users	Total Minutes in CIS	Average Minutes in CIS	Number of Users	Total Minutes in CIS	Average Minutes in CIS
Male	38	1605	42.2	53	1728	32.6	13	449	34.5	10	306	30.6
Female	34	1164	34.2	49	1883	38.4	14	553	39.5	13	628	48.3
TOTAL	72	2769	38.5	102	3611	35.4	27	1002	37.1	23	934	40.6

Missing Data = 5

TABLE 11

Time in QUEST (CIS Interest Inventory)
By Sex and Race of Users
Champaign Consortium and Truman College
March-June, 1982

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	WHITE			BLACK			HISPANIC			OTHER		
Sex	Number of Users	Total Minutes in CIS	Average Minutes in CIS	Number of Users	Total Minutes in CIS	Average Minutes in CIS	Number of Users	Total Minutes in CIS	Average Minutes in CIS	Number of Users	Total Minutes in CIS	Average Minutes in CIS
Male	37	411	11.1	40	517	12.9	12	153	12.8	6	88	14.7
Female	25	287	11.5	45	632	14.0	10	163	16.3	9	88	9.8
TOTAL	62	698	11.3	85	1149	13.5	22	316	14.4	15	176	11.7

Missing Data = 33

Non-Users = 12

22

Interview data showed that amount of time required by students was affected by two factors: (1) degree of previous familiarity with PLATO; and (2) English speaking ability. When unfamiliarity with PLATO was combined with limited English speaking ability, users became discouraged after completing QUEST and did not use any of the other files.

Poor reading skills did not affect time on system. From classroom observation, all students seemed to progress at relatively the same rate, unless hampered by anxiety over computer use or language.

2. Implications of an automated system for the role of counselors and teachers. The importance of the counselor and instructor role in relation to automated teaching or guidance systems has been documented in at least five research studies during the past decade. (Cf. Sampson, 1979; Elridge, 1972; Melhaus, 1973; Clyde, 1979; Tsai and Pohl, 1980.) However, there is virtually no research on counselor perceptions or how their activities are affected by the introduction of an automated CIDS.

This study shed some light on how much staff time may be required for satisfactory use of a moderately complicated system like CIS on a highly interactive and responsive computer like PLATO. First, staff on the average required a minimum of two hour's operation and two hour's hands-on experience in order to gain minimally adequate competence in system use. Second, at least 30 minutes of class time was needed to explain CIS structure and distribute written explanations of the system. (Project staff prepared these materials for the developmental sites.) Third, although not

initially anticipated, instructors spent from one to three hours in establishing clear referral and follow-up mechanisms to track usage and arrange for scheduling of classes. Fourth, the presence of the instructor when CIS was being used initially as part of a classroom assignment seemed essential to creating student confidence and enthusiasm.

The central nature of the instructor's role in preparing students for system usage was underscored by one unexpected project finding at Truman College. Although on-line instructions on how to use CIS were available, 75% of all students ignored this introduction altogether and of the remaining number, only 8% spent more than one minute on this content.

3. Cost Feasibility. No data were organized as part of the research project on this question.

4. Benefits to students, counselors, faculty, and institutions as a whole. User satisfaction. User satisfaction with an automated career information system seems to have been consistently high. (Reardon, 1982; Harris, 1974; Harris-Bowlsby, 1976; Linderman, 1972; McKinlay, 1971; McKinlay, 1975; Rayman et al., 1978.) Findings of this study were consistent with previous research reports. Of the 191 students and Consortium clients who responded to an on-line questionnaire regarding user satisfaction with the system, 87% thought the number of occupations on the QUEST list was good. Eighty-nine per cent (169) were also satisfied with the type of occupations on their QUEST list. Satisfaction did not seem to be

correlated with whether an individual received a large or small QUEST list (Table 12.)

Dissatisfied students spent more time on the average in CIS than satisfied students. The average QUEST list of a dissatisfied user was 51, compared to 60 for satisfied individuals. However, none of the unhappy students was left with no occupations on his/her list. (A concern of counselors was that students would feel discouraged if they received zero occupations on their QUEST list, but this does not appear to be the case.) Age, sex, and race of dissatisfied users did not differ significantly from other users for whom data were collected. Interview data with students suggest that one problem may have been the absence on a student's QUEST list of occupations related to the student's declared vocational interests.

Instructors at Truman College played a critical role in student satisfaction. Follow-up interviews with faculty indicated that a few faculty had strong reservations about the system, did not discuss system usage enthusiastically in class, and failed to make careful preparation for student sign-ons at the terminal. Table 13 illustrates instructor effects on satisfaction. The faculty member identified as "Instructor B" was opposed to the introduction of CIS; she would have preferred another system. On the other hand, "Instructor D" was strongly supportive and made a concentrated effort to explain the system in class and gave students encouragement during their first attempts at system usage.

Table 12
Satisfaction of Users with PLATO CIS
Champaign Consortium and Truman College
March-June, 1982

	Number of Occupations on QUEST List is Satisfactory		Type of Occupations of QUEST List is Satisfactory	
	AGREE	DISAGREE	AGREE	DISAGREE
Number of Clients	162	25	165	22
Percent	87%	13%	88%	12%

Missing Data = 42

TABLE 13

DISSATIFACTION OF PLATO/CIS STUDENT USERS RELATED TO COURSE ENROLLMENT, AND REFERRING INSTRUCTOR
TRUMAN COLLEGE, CHICAGO, MARCH-JUNE, 1982

Program	Referring Instructor	Number of Students Referred to PLATO	Number Dissatisfied	%
CUSI	Instructor A	36	5	14
CWE 101	Instructor B	16	9	56
CWE 101	Instructor C	14	1	7
CWE 101	Instructor D	25	0	0
Counseling 101	Instructor C	19	2	11
Counseling 101	Instructor E	4	0	0
Counseling 101	Instructor F	2	0	0

The benefits of PLATO CIS were numerous, according to staff and faculty interviews. Occupational descriptions on the system were a valuable resource, because chronic shortages of occupational handbooks cause delays and frustration for students. When combined with employability skills lessons on PLATO, CIS was a "natural followup" to course content in the same area. Students were able to visualize problems more clearly on PLATO and concentrated better, because they were forced to interact with content rather than sit passively in a lecture. PLATO CIS was more "fun" than other reference materials, according to one faculty member, and this enhanced student interest in the subject matter. Another advantage was that students were introduced to a broad span of options through which they could move quickly. Information was up to date and well researched.

PLATO CIS was time-saving not only for students, but also counseling faculty. Counseling typically involves repetitious descriptions of job requirements to students, who often begin thinking about careers with a broad question such as, "What do data analysts do?" With PLATO CIS, the student could be referred to look at occupational descriptions and then returned to the counselor with more focused and meaningful questions. This maximized the benefit from use of scarce counselor resources.

The primary benefits of CIS noted at both sites by faculty and administrators were:

1. retention of students in academic programs by clarifying occupational alternatives;
2. increased efficiency in use of counselor time with students;
3. strengthening of placement functions;
4. replacement of staff functions lost due to budget cuts;
5. expansion of resources for teaching.

5. Patterns of response in system usage. Problems of special groups. Although some research indicates that disadvantaged students benefit less from automated career guidance systems than do other groups, none of the data in the PLATO CIS project seem to support this hypothesis. Almost all users were disadvantaged, yet satisfaction was high, and faculty observed benefits both in classroom functioning and in use of counselor time. Because comparison groups were not studied in this research, it is not possible to determine whether some unusual findings were related to disadvantaged status or to other factors.

For example, PLATO CIS users in this study typically generated QUEST lists of 55 occupations -- longer than the average in other CIS studies (Table 14). There was notable variation between developmental sites, however, with average lists numbering 65 at the Champaign Consortium, and 44 at Truman College. It is possible that QUEST lists were longer at the Consortium, because participants were less clear about their preferences or how they might respond to differing workplace demands. Some CETA participants were, it was found, literally willing to consider any occupation in order to rejoin the workforce. A process of excluding or limiting options was thus antithetical to their personal immediate objectives.

Another unexpected finding was that users spent considerable time inspecting the general table of occupations in CIS. Relatively little time was allocated by users for reading specific occupational descriptions. Middle-aged whites, 30-39, were most likely to be interested in the tables, while the 20-29 age group were most apt to look at programs of study and schools information --four times

TABLE 14

Number of Occupations on QUEST Lists
Champaign Consortium and Truman College
March-June, 1982

Number of Occupations on QUEST List	CIS Users Number of Users	%
0 - 20	66	36%
21 - 50	45	24%
51 - 250	76	40%
TOTAL	187	100%

Missing Data = 19

Non-Users = 23

as likely, in fact, as older users. Individuals may be using the occupational tables as a "shopping list," browsing the world of occupations. Users may also assume that they know what a job entails and skip the occupational descriptions. For some, poor reading skills may deter them from looking at test.

In general, the least time in CIS and the least exploration of system components was displayed by people in the 17-20 age group. Further study is needed to determine whether present system characteristics, user traits, or other factors were responsible for this finding.

6. What factors are most likely to affect system usage? Interviews with faculty, students, and administration suggested several potential obstacles in on-going usage of an automated CIS. First, the orientation, management, and tracking of individuals referred for system use is susceptible to breakdown unless planning and control mechanisms are put in place. Particularly at sites which lack monitors for terminals, the problem of individual supervision may be acute. At the Consortium, where no site monitor was available, this situation was handled by programming a directed path with no options through CIS.

Second, one faculty who is well-respected by colleagues must be placed in supervision of CIDS management. This individual can act as a locus for problem-solving, can manage complaints, and can observe additional needs for staff training as they arise. This responsibility should be institutionalized rather than left to individual interest.

Data must be collected and analyzed regularly on extent and type of use in order to support continued requests for funding. Demonstrated system usage is perhaps one of the most convincing indicators to external funding sources.

Responsive programmers who can be reached for continued maintenance of the system are essential. At minimum the system must continue to work and present few operational obstacles to users.

Special efforts are required to involve teaching faculty, as well as counseling faculty. Broad faculty support can be developed by making multiple use of systems to address broader needs other than career guidance alone. A combination of computer-assisted instruction, word processing capability, and career guidance software is ideal.

A "user community" which includes other institutions is important to assist in exchange of ideas and concerns. On a network system, this can be accomplished on-line, but conferences or other means of communicating -- e.g. newsletters -- can accomplish a similar purpose for those not on a network.

Finally, an automated system cannot be used without carefully planned counselor or faculty intervention. High technology must be accompanied by "high touch" for a sustained effort to be successful.

PRACTICAL HINTS IN DESIGNING YOUR OWN CIDS EVALUATION

As discussed above, incorporation or continuation of a new automated CIDS hinges directly upon the following six evaluation issues:

1. How much time will a typical student/client spend using the system?
2. How are roles of counselors and teachers affected?
3. Are costs feasible?
4. What benefits may be expected for students/clients, counselors, faculty, and the institution as a whole? Will the experience be positive?
5. What patterns of responses may be expected from students or clients? Will disadvantaged students, older users, or other special groups respond differently to the new CIDS?
6. What factors are most likely to affect system usage?

Evaluation techniques used by the University of Illinois for each of these issues are described below, together with advantages, and disadvantages of each, and alternative approaches that could be utilized. To facilitate application by other institutions, two interview forms and screen copies of the on-line user log are contained in an appendix.

1. How Much Time Will a Typical Student or Client Spend Using the System? Although estimates of user time were discussed in counselor and staff interviews, the primary method for establishing this measure was an on-line log.

The computer system (PLATO) used for this CIDS field trial allowed for individual sign-on records for each user. This sign-on record provided each student with an individualized menu of automated programs set up by the counselor or instructor. In most cases, the menu included PLATO CIS along with a number of computerized instructional programs in employability skills.

A separate user log utility program was developed for the purpose of storing and displaying information about each PLATO CIS user. The log recorded total time in CIS, total time in each major component of CIS (including QUEST, OCCUPATIONS, PROGRAMS, SCHOOLS, and QUEST LIST), number of individual sessions on CIS, and QUEST LIST), number of individual sessions on CIS, and QUEST responses and QUEST LIST occupations. The log also recorded each student's responses to each QUEST question, the number of occupations on the QUEST LIST and the satisfaction responses for that student's original use of QUEST and for that student's last (or current) use of QUEST. See Appendix A for screen copies of user log displays.

No attempt was made to log time spent with teacher or counselor outside of PLATO CIS. In particular, there was no comparison attempted of total time in counseling with/without an automated CIDS.

The on-line user log provided a history of all PLATO CIS users. Once the log programming was completed, it was entirely automatic and required no further administrative effect or cost. The break-down

of time in CIS into total time in each major component (labeled "unit timers" in Appendix A) provided information on the pattern of activity within CIS.

The user log also automatically restored a student's last QUEST responses for each new terminal session. An extra bonus of the user log was that it could serve as a student-management tool for counselors. Access to the log was made easy for instructors or counselors, and display formats and selection of information stored were defined in accordance with needs and interests of counselors and teachers as well as with the evaluation aims in mind.

Insufficient time was set aside for collection of initial log data. Consequently, several major internal data format revisions were made to the log before it was done. Since Illinois CIDS (HORIZONS) was in operation, each such change required a corresponding conversion on a data base. Early display programs were less convenient to use. However, the log did function appropriately when it was converted to the most recent format.

2. How Are Roles of Counselors and Teachers Affected? Primary evaluation techniques were interviews with counselors and administrators; and observation of PLATO CIS use by groups with their counselors or teachers. Two interview probes were developed (see Appendix A). UI staff performed interviews and classroom observations.

A unique aspect of this evaluation was inclusion of interviews with administrative staff. These provided opportunity to assess administrative perceptions of system usage, and the usage and attitude

reports were sent to administrators in time to be used as justification for request for funds for continuing CIDS.

Teachers were not interviewed.

Real strength of field interviews is opportunity to probe more deeply into specific areas for each individual interviewed.

Counselors were interviewed only after the field trial, so no assessment could be made of change in counselor attitudes. Although some observation of counselor behavior with class at the PLATO terminals was made, there was no observation of counselors working with students outside of PLATO CIS.

Teachers were not able to be interviewed as is common in studies of automated career systems. However, it is generally agreed that regular content classes (i.e. classes outside of career exploration of career guidance classes) often contribute significantly to students' career choices. Consequently, it is to be hoped that assessment of the role that teachers play in the career decision process; and their interaction with the CIDS can be examined and reported on in future studies.

3. Are Costs Feasible? Only direct costs of CIDS were computed:

- hardware
- communications
- computer usage
- subscription fees.

These costs were reported to administrators so they could determine direct budgetary outlay required to continue CIDS during the next

fiscal year. Not much is known about indirect, or hidden costs of CIDS compared with benefits. It was felt by some counselors that CIDS enabled them to concentrate upon more significant individually focused issues with students/clients. Before CIDS they felt that much of their time with students was spent repeating the same information to student after student, and not getting to decision problems specific to an individual's background and goals. An in-depth study of cost/benefits of CIDS would be valuable for improving operation and acceptance.

4. What Benefits May Be Expected For Students Or Clients, Counselors, Teachers, And The Institution As A Whole? Will The Experience Be Positive? Evaluation techniques used included:

- on-line questionnaire of student satisfaction (see Appendix A),
- interviews with a sample of students after they had used CIDS, and
- interviews with counselors and administrators after the field test had occurred.

User satisfaction is an important baseline measure - especially for a new automated system. It is fairly easy and inexpensive to perform, and it is found in nearly every study of automated CIDS (and CAI/CMI). Caution must be exercised in interpreting the results. In case of the PLATO CIS data, the satisfaction data was collected with two on-line questions (see Appendix A). Overall

satisfaction was high - 85% of students responded yes to both questions. This is consonant with other studies. However, at least one student answered that he was satisfied with the number and type of occupations on his QUEST LIST although he had not responded to QUEST at all. Another student answered yes to both questions although his QUEST responses had eliminated all occupations from his QUEST -- so he was "satisfied" with the number and type of the Ø occupations left on his QUEST list! The extent to which answers to such a short on-line questionnaire correspond to students' actual satisfaction with CIDS results requires a reliability study. In the present study, on-line questionnaire data was balanced with interviews with a sample of students and clients (see Appendix for the interview forms).

An assessment of benefits other than satisfaction was not attempted in this study. As mentioned above, some counselors felt the automated CIDS enabled them to provide more meaningful individual sessions with students. Numbers of students served per counselor hour available are increasing dramatically as school and CETA budgets are decreased. Student throughput is being increased with or without an automated CIDS. The research literature does not provide much information on the effects of these institutional changes. Some important questions for further research are:

a. Does an automated CIDS reduce the extent of program dropouts or program switches?

b. Can an automated CIDS improve placement effectiveness of the institution? Might it help improve interview performances and resume quality?

c. Are there other internal benefits from an automated CIDS? Can CIDS help a student or client make better program choices earlier?

5. What Patterns of Responses Can Be Expected From Students Or Clients? Will Disadvantaged Students, Older Users, Or Other Special Groups Respond Differentially To The New CIDS? This question was a major focus of the current study. Three separate evaluation procedures were used:

a. On-line user log (see discussion under 1) above). Times for each student in each major component of CIS provided a profile of the student's behavior within CIS. QUEST responses and LIST provided information on student input to CIS and output from it.

b. Institutional records for each student. These provided demographic information on each student, and program, course, instructor, and intent. Other demographic characteristics were collected on-line (see Appendix). For two groups the WRIOT and Strong-Campbell records were also collected.

c. Interviews with students and with counselors (see Appendix for interview forms).

This evaluation has provided important new information for the development and implementation of automated CIDS for disadvantaged users. Since numbers of users in each group were small, further studies are needed to establish statistical significance and replicability. But the current study does suggest several plausible hypotheses.

6. What Factors Are Most Likely to Affect System Usage?

Evaluation procedures already mentioned were also relevant to this question: on-line user log, interviews, observation, and institutional records. In addition the PLATO system provided a fast and convenient method for getting feedback on system operation. Any computer errors were automatically logged into an on-line notes file. All counselors were trained to use a "comment" option which allowed them (and the students) to make an on-line comment. On any screen display they could make their comment without erasing or losing the original display. The comments were automatically sent to a notes file which was monitored by IOICC and University staff.

A second important issue affecting usage is availability of terminals. In both institutions, terminal time was at a premium. Most usage occurred during class or scheduled times, and not much time for the exploration was available.

One other major factor affecting satisfaction and usage was orientation and training of users by counselor (see discussion in earlier sections).

One factor that definitely affects usage is basic operation of the automated CIDS:

a. No computer errors,

b. No double-or over-writing,

c. Functions and key presses that work as advertised,

d. Directions that are easy to read and understand,

e. QUEST questions that are clear,

f. QUEST LIST that "makes sense," and

g. Narrative information that is understandable and reasonable.

During the field test, over 500 "comments" were sent on the above issues. When errors were identified, they were fixed. In general, functioning of the system was known.

It is not well understood what effect the delivery media have upon usage of a CIDS. A comparison could be made, within a single institution context, of usage, satisfaction and other effects of CIS delivered on PLATO, Silent 700, micro computer, and needle deck.

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APPENDIX A

Please answer the following questions to help us learn more about the users of CIS.

1. Are you [male] or female? (press "m" or "f")

2. How many years have you lived in this country? (Press the appropriate letter from the list.)
   [a. Longer than 10 years]
   b. From 5 to 10 years
   c. Less than 5 years

3. What is your race? (Press the appropriate letter from the list below.)
   [w. white]
   b. black
   h. hispanic
   n. native american
   a. asian pacific american
   o. other

4. Please type in your age, then press NEXT. 20

Thank you very much for answering our questions!
Press NEXT key to continue on to CIS.

A-1

1. Are you satisfied with the NUMBER of occupations on your current QUEST list? (press ["y"] or "n")

2. Are you satisfied with the TYPE of occupations on your QUEST list? (press "y" or ["n"])

Thank you for answering these questions.

Press [NEXT] to continue.

A-2

CIS USER LOG

Log directory started by	Last twenty users	
dave/pasr	pete zelchenko	advisor
on 07/18/82 at 15.06.57.	pete	pasr
	a student	mvcppc
Nameset: cisulns	chester bell	ccc
Dataset: cisulds	karen chase	cclink
	marshall daryl	ocollifs
Last entry into CIS	torres ruben	tcicp2
12/01/82 at 17.23.36.	jones cordella	tcicp2
	nolan marie	tcicp2
Miscellaneous Information	tt student	mvcppc
	barton dulania	icids
Total entries: 996	regina sallee	cclink
	albert peat	cclink
Users stored: 348	gary harris	cclink
Groups stored: 40/54	eddings valarie	ocsx
Nameset records: 41/57	polo	mvcppc
	mary hodges	ccc
	chester bell	ccc
	torres armando	tcicp2
	liedtke	mvcppc

Press DATA to replot this information,
NEXT to look at users/groups,
LAB to see special options,
SHIFT-BACK to leave, or
SHIFT-HELP to initialize this database.

A-3

Type the name of a user or group.

»

Press DATA for a list of groups, or

Press HELP for a list of available actions.

A-4

List of groups from nameset "tnset".

1. a	28. educomp	55. mvcc	82. siua
2. a..ro	29. ee	56. mxc	83. sium
3. afrotc	30. eiu	57. o	84. skill
4. arl	31. exp	58. ocsx	85. sw310
5. astudent	32. gap	59. ohc	86. tcibl
6. batch	33. gold	60. olc	87. tcico
7. cclink	34. graham	61. orions	88. tcicp
8. ccwc	35. hardcore	62. oumed	89. tcicu
9. ceta	36. hawaii	63. park	90. tciin
10. chanute	37. hopkins	64. parkland	91. tcina
11. chemproc	38. horizons	65. parks	92. tcipl
12. child	39. ic	66. pasr	93. tcisdemo
13. cicids	40. icids	67. pcp	94. tcisp
14. cistest	41. intercom	68. pcpa	95. tfaculty
15. conn	42. ioe	69. pcpz	96. tgroup
16. cop82	43. iu	70. pea	97. truman
17. cop84	44. iuplato	71. peg	98. uhcoe
18. cpl	45. joliet	72. pega	99. uicc
19. csf	46. kkc	73. polysci	100. uicca
20. daley	47. lll	74. pser	101. uifin
21. dcs	48. matha	75. rehab	102. uimatha
22. denx01b	49. mcl	76. rprp	103. uimc
23. dialup	50. medpeo	77. rush	104. ustaf
24. distech	51. mfl	78. rushcd	105. ustore
25. dmax01h	52. monitors	79. s	106. vienna
26. duosoft	53. music	80. semc	107. votec476
27. edct442	54. musician	81. shcs	108. wright

Press NEXT for more groups.

Roster for group "cclink". (114 users.)

1. (-) amos kyse	27. (-) debra woodmansee
2. (-) amy evenson	28. (-) derrick brown
3. (-) andre mostert	29. (-) doskey mcneil
4. (-) anita harper	30. (-) douglas rozier
5. (-) anthony smith	31. (-) duc tang
6. (-) anthony weber	32. (-) ebbie shelton
7. (-) arzell webster	33. (-) elaine boatner
8. (-) audie stratton	34. (-) frank moore
9. (-) beverly gardner	35. (-) frieda myers
10. (-) brenda chatman	36. (-) gladys hunt
11. (-) brenda mcclellan	37. (-) goria hayes
12. (-) brian mcsherry	38. (-) holly mirell
13. (-) brian suiter	39. (-) james prince
14. (-) carolyn mcneal	40. (-) janice lemmons
15. (-) catherine blackwel	41. (-) jean babb
16. (-) charles corey	42. (-) jessie pena
17. (-) charles grice	43. (-) john payne
18. (-) charlotte jones	44. (-) joseph black
19. (-) chris farmer	45. (-) joseph shelton
20. (-) cordie dunlap	46. (-) joyce rothgeb
21. (-) cozy metcaf	47. (-) jo freeman
22. (-) cynthia evans	48. (-) julie white
23. (-) dana miller	49. (-) katherine jenkins
24. (-) david hartsfield	50. (-) ken crockett
25. (-) david karr	51. (-) ken redman
26. (-) david somers	52. (-) kevin riley

Press NEXT for more users.
Press SHIFT-NEXT or SHIFT-BACK to page between groups.

Enter a name, number, name/group, or /group.
>
Press NEXT to see, or SHIFT-NEXT on a group for the roster.

User's signon (-)
ron brougher/cclink

Starting date of record
06/01/82

Most recent entry date
06/04/82

Miscellaneous information

Total time: 1:41.18
Entries: 5
User: 92 of 114
SCORE: 7/ 0/ 0

Orig. satis. with number: ---
Orig. satis. with type : ---
Orig. no. of occupations: 35

Question (0)	Ans
1 Continuous	NS
2 Precise	YES
3 Using Facts	YES
4 Working with Others	YES
5 Persuading	YES
6 Decision Making	NO
7 Change	YES
8 Creative	NO
9 Eye Hand Coordination	MED
10 Working with Fingers	LOW
11 Checking Accuracy	MED
12 Use of Words	HIGH
13 Use of Numbers	HIGH
14 Catching on to Things	HIGH
15 Seeing Detail	HIGH
16 Physical Activity	MED
17 Education & Training	TWO
18 Beginning Wage	700
19 Work Setting	IN
20 City Size	NS
21 Region	US

LAB: other page of data
DATA: replot
SHIFT-DATA: switch QUEST lists
SHIFT-LAB: make local prints
SHIFT-NEXT: roster of group
NEXT/BACK: forward/backward
SHIFT-HELP: QUEST list
SHIFT-BACK: return to directory

Enter a name, number, name/group, or /group.
>
Press NEXT to see, or SHIFT-NEXT on a group for the roster.

User's signon (-)
ron brougher/cclink

Starting date of record
06/01/82

Most recent entry date
06/04/82

Miscellaneous information	
Total time:	1:41.18
Entries:	5
User:	92 of 114
SCORE:	1/ 0/ 0
Curr. satis. with number:	---
Curr. satis. with type :	---
Curr. no. of occupations:	146

	Question (C)	Ans
1	Continuous	YES
2	Precise	YES
3	Using Facts	YES
4	Working with Others	YES
5	Persuading	YES
6	Decision Making	YES
7	Change	YES
8	Creative	YES
9	Eye Hand Coordination	HIGH
10	Working with Fingers	HIGH
11	Checking Accuracy	HIGH
12	Use of Words	HIGH
13	Use of Numbers	HIGH
14	Catching on to Things	HIGH
15	Seeing Detail	HIGH
16	Physical Activity	YES
17	Education & Training	TWO
18	Beginning Wage	700
19	Work Setting	NS
20	City Size	NS
21	Region	US

LAB: other page of data
DATA: replot
SHIFT-DATA: switch QUEST lists
SHIFT-LAB: make local prints
SHIFT-NEXT: roster of group
NEXT/BACK: forward/backward
SHIFT-HELP: QUEST list
SHIFT-BACK: return to directory

Enter a name, number, name/group, or /group.
»
Press NEXT to see, or SHIFT-NEXT on a group for the roster.

User's signon (-) ron brougher/cclink		Sex: Male Race: White Age: 34 Time in country: >10 years
Section	Time	Last 11 Occupations Seen*
CIS Information	0.00	
QUEST	25.13	**2356**
QUEST Answers	0.18	**2354**
QUEST List	0.00	**2354**
Occupations Table	26.23	**5464**
Occupation Text	20.27	**3166**
Programs Table	2.03	**3165**
Program Text	1.52	**1454**
Schools Table	1.63	**4618**
School Text	1.97	3166
WHYNOT	0.00	3142
Attributes	0.00	3112
Miscellaneous	22.13	
Deficit from total	0.00	*Occs. on list in boldface

Press LAB for additional data,
DATA to replot this page,
SHIFT-LAB to make local prints, or
SHIFT-BACK to return to the directory.

QUEST Scor-O-Matic Template Editor

#	Description	N	a	b	c	d	e	f
1	Continuous	0	0	0	0	0	0	0
2	Precise	0	0	0	0	0	0	0
3	Using Facts	3	0	0	0	0	0	0
4	Working with Others	0	0	0	1	5	0	5
5	Persuading	2	0	4	2	0	0	5
6	Decision Making	1	1	7	0	0	0	0
7	Change	1	0	0	0	0	0	0
8	Creative	1	0	0	0	0	0	0
9	Eye Hand Coordination	1	0	0	0	0	0	0
10	Working with Fingers	1	0	0	0	0	0	2
11	Checking Accuracy	0	0	0	0	0	0	0
12	Use of Words	2	0	0	0	0	0	0
13	Use of Numbers	0	0	0	0	0	0	0
14	Catching on to Things	0	0	0	0	0	0	0
15	Seeing Detail	3	0	0	0	0	0	0
16	Physical Activity	1	0	0	0	0	0	0
17	Education & Training	2	0	0	0	0	0	0
18	Beginning Wage	2	0	0	0	0	0	0
19	Work Setting	0	0	0	0	0	0	0
20	City Size	0	0	0	0	0	0	0
21	Region	1	0	0	0	0	0	0
22	Question 16A	0	0	0	0	0	0	0

Press BACK to return to the special options.

Question:

NAME

DATE

CIS
Champaign Consortium
Client Interviews

1. Previous use of PLATO

   _____ Yes

   _____ No

2. Previous use of career information system

   _____ Yes

   _____ No

3. Reason for using CIS

   _____ Testing and Assessment

   _____ Job Club Assignment

   _____ Other

   _____

4. Expectations for CIS

5. Understanding of questions (examples)

6. Occupations of interest

   a. List

6. Occupations of interest (continued)

   b. On QUEST list

7. Criticisms of CIS

8. Strengths of CIS

9. Work experience

10. Counselor Contact (school, military, Job Service)

NAME

DATE

CIS
Truman College
Student Interviews

1. Previous use of PLATO
   _____ Yes
   _____ No

2. Previous use of career information system
   _____ Yes
   _____ No

3. Reason for using CIS
   _____ Class assignment
   _____ Personal interest
   _____ Other
   _____

4. Expectations for CIS

5. Understanding of questions (examples)

6. Occupations of interest
   a. List

6. Occupations of interest (continued)
   b. On QUEST list

7. Criticisms of CIS

8. Strengths of CIS

9. Program of Study

---

10. Work experience

11. Counselor Contact

(NAME)

(DATE)

CIS-QUEST CLIENT EVALUATION

Directions:

Please complete this evaluation by rating each question from 1 to 5. Circle one of the 5 numbers for your answer.

1. How easy were the directions to follow:

1	2	3	4	5
Very easy	Somewhat easy	Neither hard nor easy	Somewhat hard	Very hard

2. How easy was it to read?

1	2	3	4	5
Very easy	Somewhat easy	Neither hard nor easy	Somewhat hard	Very hard

3. Do the occupational areas listed for you seem to agree with your true interests?

1	2	3	4	5
Strongly agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Strongly disagree

4. In general, how useful do you consider CIS-QUEST?

1	2	3	4	5
Very helpful	Somewhat helpful	Neither helpful nor unhelpful	Somewhat unhelpful	Very unhelpful

Comments:

(NAME)

(DATE)

WIDE RANGE INTEREST OPINION TEST

CLIENT EVALUATION

Directions:
Please complete the following evaluation by rating each question from 1 to 5. Circle one of the 5 numbers for your answer.

1. How easy were the directions to follow?

1	2	3	4	5
Very easy	Somewhat easy	Neither hard nor easy	Somewhat hard	Very hard

2. How easy was it to take?

1	2	3	4	5
Very easy	Somewhat easy	Neither hard nor easy	Somewhat hard	Very hard

3. Do the occupational areas which you scored high in seem to agree with your true interests?

1	2	3	4	5
Strongly agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Strongly disagree

4. In general, how useful do you consider this interest test?

1	2	3	4	5
Very helpful	Somewhat helpful	Neither helpful nor unhelpful	Somewhat unhelpful	Very unhelpful

Comments:

APPENDIX B

Description of PLATO CIS

PLATO CIS starts with the QUEST questionnaire. Twenty-one questions are presented on the screen one-at-a-time. These questions assess preferences or desires on work-related issues such as: nature of work preferred, level of abilities desired, amount of physical activity desired, entry wage desired, indoor/outdoor work, and location of work.

Each question is displayed on the screen and the user responds by pressing an appropriate key. When the questionnaire has been completed, or any part of it, a list of related occupations is displayed for the user according to whether attributes of the occupation match the preferences of the user as recorded in the responses to the questions. The list of related occupations is designed to provide the user with new career suggestions.

The information base for PLATO CIS consists of three files: the Occupations file, the Programs file, and the Schools file. The user can request detailed information on occupations, education and training programs, and schools. The Occupations file includes a description of the work, and information on hiring practices, current

employment, wages and outlook, and how to find more information. In addition, each occupational description tells which education and training programs will prepare the user for that occupation. The Programs file contains information on education and training programs from apprenticeship programs to college and university level. Descriptions include content, length of time, special tests, related programs and how to get further information. The Schools file will contain information on over sixty topics on all public and private college, universities, and training schools in the state. This section includes information on admissions, costs and financial aids.

PLATO CIS has several distinctive features. First, it is entirely screen-based. Tables of occupational titles and numbers, program titles and numbers and school names and numbers are all on-line. In addition, explanatory displays have been programmed which give the user instructions on system use. PLATO is unusually responsive and accessible to the user. Special function keys on the keyboard allow the user to move within the system easily by simply pressing a key. Examples of these keys include: NEXT, BACK, DATA, LAB. CIS is the most replicated system with the longest continuous use. CIS is used in seventeen states and has served as a model for the Department of Labor.